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BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES

Application Number: 09/996,244
Filing Date: November 28, 2001
Appellant(s): SCHAEFER ET AL.

September 17, 2007

Mark Levy
For Appellant

EXAMINER'S ANSWER

This is in response to the appeal brief filed 6/28/07 appealing from the Office action mailed 12/12/03.

(1) Real Party in Interest

A statement identifying by name the real party in interest is contained in the brief.

(2) Related Appeals and Interferences

The following are the related appeals, interferences, and judicial proceedings known to the examiner which may be related to, directly affect or be directly affected by or have a bearing on the Board's decision in the pending appeal: Appeal No. 1999-1059 for Application 08/376,846 filed on January 23, 1995, and decided on September 28, 2001

.(3) Status of Claims

The statement of the status of claims contained in the brief is correct.

(4) Status of Amendments After Final

The appellant's statement of the status of amendments after final rejection contained in the brief is correct. However, the date of the amendment should read, May 14, 2004" instead of "May 4, 2004."

(5) Summary of Claimed Subject Matter

The summary of claimed subject matter contained in the brief is correct.

(6) Grounds of Rejection to be Reviewed on Appeal

The appellant's statement of the grounds of rejection to be reviewed on appeal is correct.

(7) Claims Appendix

The copy of the appealed claims contained in the Appendix to the brief is correct.

(8) Evidence Relied Upon

a. Board Decision on parent case SN 08/376846, 9/28/01.

b. Hodgeman et al., Handbook of Chemistry and Physics, 43rd edition, published by the Chemical Rubber Co., Cleveland, Ohio, 1961, pp. 450-469, 472, 473, 478-483, 488, 489, 494, 495, 500, 501.

c. Nucleonics, February 1961, p. 70.

d. Kosvintsev, et al., "Possible Use of Wall Traps and Magnetic Traps of Ultra-Cold Neutrons for Measuring the Lifetime of the Free Neutron, Instruments and Experimental Technique, vol. 20, No. 1, pt. 1, Jan-Feb. 1977, pp. 43-45.

e. Jimenez-Vazquez, "Hot-atom incorporation of tritium atoms into fullerenes, "Chemical Physics Letters, 21 October 1994, pp. 111-114.

f. Braun et al., "Endohedral incorporation of argon atoms into C_{60} by neutron irradiation," Chemical Physics Letters 237 (1995), pp. 443-447.

g. Bolz et al., CRC Handbook of Tables for Applied Engineering Science, published by the Chemical Rubber Co., p. 390 (1970).

(9) Grounds of Rejection

The following ground(s) of rejection are applicable to the appealed claims:

Claim Rejections - 35 USC § 112

The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

a. Claims 1-8, 10-14, 16-19, 29, 33, and 34 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the enablement requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to enable one skilled in the art to which it pertains, or with which it is most nearly connected, to make and/or use the invention. Applicant's claimed invention is a fullerene molecule having one or more free thermal neutrons trapped therein.

The specification (e.g., see page 5, lines 1+) indicates this trapping of thermal neutrons will take place if one irradiates the fullerene molecules with a neutron flux. However, there is neither an adequate description nor enabling disclosure as to how and in what manner it is determined and ensured that thermal neutrons are actually caused to be trapped in the fullerenes and, to remain trapped therein, until they decay or until they are utilized in any of the manner set forth in the specification. More specifically, there is no disclosure of what causes a neutron, from the beam of irradiating thermal neutrons, to penetrate only one wall of the fullerene and to not penetrate, contact, be absorbed in, etc. the opposite wall of the fullerene such that it will remain trapped inside the fullerene as a free thermal neutron (there is also no disclosure of how and in what manner it is determined that such actually takes place as alleged in the specification).

There is no disclosure of how and in what manner one can positively determine that the thermal neutron is actually trapped inside the fullerene as a free thermal neutron rather than being bonded to, or even just be reflected among the carbon atoms present in the fullerene sample.

As noted by the Board in the parent case SN 08/376846, page 112 of Jimenez-Vazquez indicates that although some tests indicate that a substance is bonded to a fullerene, these tests do not necessarily prove that the substance is within the fullerene.

Kosvintsev et al. on page 43 indicate that the walls of the traps can absorb neutrons inside a trap.

The "example" set forth on page 7+ of the specification is insufficient as it is not clear from the example as to exactly what the conclusion recited on page 9, lines 18-30 (i.e., that the radiation detected was from the decay of free neutrons trapped inside the fullerenes) is based on.

For example, the actual steps recited in the specification (e.g., see pages 7+) are too vague and incomplete to enable one to make a proper and accurate analysis of exactly what was done, what was detected, etc.

There is no indication of the various possible errors and sources of errors including systematic errors, cumulative errors, instrument errors, etc. Such is necessary in determining the applicants' conclusions or interpretation of the experimental results.

The interpretation or even inadvertent misinterpretation of experimental data, as the case may be, goes to the heart of the matter. In any experiment, there will be errors (due, for example, to the instruments themselves since no instrument is 100% error free) and, there are data that must be collected and interpreted.

Further, in any experiment, there will be errors introduced due to systematic or cumulative errors, as well as instrument errors since all instruments have some error in their measurements, the amount of error being dependent, for example, on the type and quality of the instrument. Clearly, if the results fall within the limits of experimental error, the results have no probative value.

In the instant case, applicants have neither identified all of the various errors nor have applicants shown that their results fall outside the error limits.

In the same vein, the examiner has shown that gross beta counters (used by the applicants in obtaining their results, as indicated on page 8 of the specification) are susceptible to more than just betas and gammas (see page 390 of Bolz et al., as evidence). This, in itself, could introduce errors that could negate applicants' interpretation of their data as being indicative of the presence of trapped thermal neutrons.

As a further source of error, it is noted that Jimenez-Vazquez et al. in the first column on page 113, state that it is not known how much the C_{60} cage can shield the emission of a beta particle (which is what applicant's are attempting to detect).

While the example in the specification indicates that the empty vial was weighed, there is no indication that the "sample" was weighed before being placed in the vial, after being placed in the vial, after irradiation, and after removal from the vial.

The disclosure is insufficient as to the isotopic content of the "sample" (including all impurities and/or contaminants present). Such is clearly pertinent to the patentability of applicants' invention since these impurities and/or contaminants could be made radioactive by the neutron irradiation and, if they are beta or positron emitters with a half life on the order of 10 minutes, give a false indication of trapping of thermal neutrons in the fullerenes.

Note in this respect that Braun et al. in the second column on page 443 state that commercial fullerenes contain non-negligible amounts of impurity elements that can be made radioactive (activated) by neutron irradiation, all of which can lead to erroneous results.

In further regard to this issue of impurities and/or contaminants, it is noted that applicant's in part (d) on page 6 of the Appeal Brief in parent case 08/376846, state that in their experiments, the contaminants varied from sample to sample and sometimes from test to test of the same sample! Such additionally makes it appear that the "sample" could become contaminated at any point during the experimental procedure and thus, also introduce errors.

If the experimental procedures were such that contaminants can be so introduced (particularly from test to test of the same sample), any conclusions drawn from these experiments would be suspect.

There is no indication as to why the various time periods of irradiation indicated in the example on page 7 of the specification, were utilized.

It is not clear from the "example" as to exactly when the first gamma analysis is performed. However, it appears that there is an initial "window" of at least 14-15 minutes (or even over 30 minutes – see step 8) after removal from the neutron flux before gamma analysis is performed, and thus, gamma emitters with shorter half lives would presumably be considered beta emitters and, as erroneous evidence of free thermal neutrons trapped in the fullerenes.

The example is insufficient in failing to set forth all of the contaminants and impurities detected during the analysis (including any contaminants whose decay could be mistaken for the decay of free neutrons). Such would be useful in determining the accuracy of applicants' conclusions concerning the experimental results.

The specification on page 9 indicates that there are some pure beta emitters with a half-life on the order of 10 minutes. However, it does not appear that such emitters were searched for in the "sample." The disclosure is insufficient as to how and in what manner it was ensured that there were not present any other beta emitters (including non-pure beta emitters or beta emitters that also emit other radiation) with a half-life on the order of 10 minutes. The

examiner in parent case SN 08/376846 had pointed out to applicant that there are other beta emitters including pure beta emitters (as well as positive beta (positron) emitters which have a half life of around 10 minutes, e.g., As-79, Rb-91, Mo-102, Cs-139, Ho-154, Ce-131, Cd-119, Fe-53, Cu-59 and N-13.

Nucleonics and Hodgeman et al. also indicate that there are numerous beta emitters (both negative and positive) having a half life close to 10 minutes, any of which could cause interference and lead to erroneous results or misinterpretation of experimental results. It is not seen wherein the applicants have accounted for such.

The disclosure is insufficient as to how and in what manner the neutrons can be entrapped by controlling the temperature of the fullerenes.

The 9/28/01 Board Decision is parent case SN 08/376846 is still considered pertinent and is incorporated herein. A portion of the Board's statements on pages 6-8 thereof is reproduced herein for applicants' convenience.

"We note that appellants' disclosure indicates that prior to the instant invention there was no known procedures for encapsulating neutrons within a fullerene molecule (specification at page 2). Yet, the only procedure in appellants' specification for capturing thermal neutrons within the fullerene molecule is to expose a fullerene molecule to a neutron flux of 10 to 500 kilowatts for about 5 to 15 minutes (specification at pages 5 and 7).

The specification states that the evidence that neutrons are trapped in the fullerene molecule consists of the presence of pure beta emitters with a half life of ten minutes in the fullerene that remain after the counts from the gamma emitters have been stripped from the raw data.

The appellants' specification also states that there are few pure beta emitters and that fewer have a half-life of ten minutes. However, the appellants have not submitted evidence to establish that the beta emitters in the fullerene molecule are not in fact other pure beta emitters. In this regard just because there are few pure beta emitters other

than thermal neutrons does not establish that these other pure beta emitters are not within the fullerene.

In addition, it is our view that a person of ordinary skill in the art would not be enabled by the appellants' disclosure to ensure that even if thermal neutrons are the pure beta emitters, these thermal neutrons are in fact within the fullerene molecule rather than in the sample outside the fullerene or bonded to the fullerene itself. In this regard, we note that Jimenez-Vazquez at page 112 indicates that although some tests may indicate that a substance is bonded to a fullerene, these tests do not necessarily prove that the substance is within the fullerene.

The appellants have presented several arguments in the brief which seek to establish that thermal neutrons are encapsulated within the fullerene. However, argument of counsel is no substitute for evidence. The only evidence submitted by the appellants is a declaration of Joseph W. Talnagi. The examiner has not considered this declaration. The declaration states:

> *I consider the procedure effective to confirm the presence of free thermal neutrons in a fullerene molecule. I believe that he procedure described in the patent application at pages 7-9 could easily be repeated by a person skilled in the art of activation analysis to detect thermal neutrons trapped in a fullerene molecule.*

The above statements are conclusory in nature and the declaration does not include facts upon which the conclusions were based and therefore, even if we were to consider this declaration, it does not rebut the examiner's prima facie case of lack of enablement."

The instant application contains a "Second Declaration of Joseph W. Talnagi" filed 6/26/02 to presumably overcome the deficiencies noted above by the Board. However, this Second Talnagi declaration is also insufficient.

This declaration on page 1 states that to obtain the alleged fullerene having one or more free thermal neutrons trapped inside, the procedures outlined on pages 7-10 of the applicants' specification were followed.

The examiner, as set forth above, has noted various deficiencies with the steps outlined on pages 7+ of the specification which could lead to erroneous results. The declaration does not address these deficiencies and hence does not overcome them.

Further, as noted by Hodgeman et al. and Nucleonics, there are other beta emitters having a half-life in the range of 6.0-15.0 minutes, other than the ones referenced on page 2 of said declaration, any of which could give erroneous results (the declaration is also insufficient as to why the range was limited to 6.0-15.0 minutes).

Said declaration states on page 2 that the "fullerene used for the experiment was carefully analyzed", but it is insufficient in failing to state what said careful analysis consisted of.

On pages 2 and 3 of the declaration, the declared states in response to the issue raised by the Board that it is "unlikely" that a free thermal neutron would attach itself to a fullerene or escape from the confines of the sample and that the "most likely location" for a free thermal neutron would be within the central cavity of a fullerene molecule.

These statements represent the declarants' opinion and are not conclusory in nature, as they are not supported by factual evidence. No weight is given to an opinion declaration on the ultimate legal conclusion in issue. See MPEP 2164.05.

b. Claims 4-8, 10-14, 16-19 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

The claims appear directed to a fullerene molecule per se; however, it is not clear from the claim language exactly what is being claimed, and the metes and bounds of the claims are thus undefined.

It is noted that applicant on page 3 of the 10/30/02 response, as well as on page 6 of the 7/18/096 response in parent case SN 08/376846, for example, indicates that no utility is being claimed in these claims and thus, these claims appear redundant to claims 1-3.

Further rendering this confusion is that claims, such as claim 13, appears to be specifically directed to a method of use, or doing something to the fullerene molecule.

For example, claim 5 refers to providing the fullerene molecule with an electrical charge.

Claim 7 recites that the fullerene is useful as an irradiation target for bombardment by other particles.

Note that a claim is indefinite where it merely recites a use without any active, positive steps delimiting how this use is actually practiced. See MPEP 706.03(d).

(10) Response to Argument

a. 112, First Paragraph Rejection

Appellants argue that the issues raised by the examiner regarding experimental error and misinterpretations of experimental results are issues that

"go to the underlying theory of the invention and not enablement." They further argue that the examiner's rejection of the claims "is based upon 'suspicions' that applicants have not done what they claim to have done; namely trapped a thermal neutron in a fullerene molecule." The examiner disagrees.

Appellants themselves admit the there is no known procedure for trapping and isolating neutrons within a molecule (see page 2, lines 24+, of the specification). Clearly, appellants are attempting to break new scientific/technical ground associated with their claimed invention. The examiner has identified possible explanations for appellants' results and observations, other than what appellants claim are the result of decay of trapped thermal neutrons within the fullerene molecule. Consistent with normal scientific/technical practice, as proponents of a novel concept of neutron trapping, appellants have to show that alternative explanations are not valid and the only possible explanation for their observation is due to the trapped neutron.

The issue of experimental error and misinterpretation of results are NOT directed to the underlying theory of the invention, contrary to appellants' allegation. Rather, they are directed to the experiments themselves, and whether the experimental results and their interpretation provide support to appellant's concept. These issues go to heart of the question of whether the invention, as claimed, actually works. If appellants' results and conclusions are based on misinterpretation of the data or errors in the experiment, then the concept is not valid and therefore the claimed invention lacks of enablement.

The alternative explanations put forward by the examiner are not "suspicions" as appellants allege. Rather, they are technically sound matters that one having ordinary skill in the art at the time of the claimed invention would have raised upon reading the disclosure. The examiner's approach is consistent with that applied in the examination of parent application SN 08/376846 and the Board affirmed the rejection of claims under 35 U.S.C. 112, first paragraph, in said application. Note also the following statement in the 9/28/01 Board Decision in the parent case, which is directly related to appellants' allegation:

> "Thus, the dispositive issue is whether the appellants' disclosure, considering the level of ordinary skill in the art as of the date of appellants' application, would have enabled a person of such skill to make and use the appellants' invention without undue experimentation. The threshold step in resolving this issue as set forth supra is to determine whether the examiner has met his burden of proof by advancing acceptable reasoning inconsistent with enablement. We adapt this reasoning and provide the following additional comments." Underlining provided. See page 6 of the Board Decision.

The examiner's alternative explanations for appellants' conclusion represent acceptable reasoning with firm bases and are not merely "suspicions".

Appellants argue that they meet the 112, first paragraph enablement requirement, as evidenced by Joseph Talnagi's Second Declaration. The examiner has already demonstrated in section 9 a) above that this declaration has no probative value.

Appellants argue that they meet the enablement requirement because:

> "[a] person skilled in the art, based upon the teachings in the Specification can clearly take fullerene molecules, which are commercially available, an place them in the thermal neutron flux of a nuclear reactor and obtain a product which exhibits a beta emission."

The examiner disagrees. The instant application is a continuation of parent application 08/376846. The source of the samples for the "example" in the parent application was SES Inc., in Houston TX (see page 4, lines 26+ of the specification). In the 5/14/04 Appeal Brief appellant states that the source of their samples was a different company, i.e., MER Corp in Tucson, AZ (page 6 and Table I on page 8). This different source for the samples was further affirmed in appellant's 10/08/04 Appeal Brief (see page 6, 2nd full paragraph) and in the 1/14/05 telephone interview held between appellants' representative and the previous examiner of this application.

In both briefs appellant states that:

> "The fullerenes available from chemical and laboratory companies have steadily improved in purity. The applicants recently have tested samples where the only activated contaminant was ^{41}Argon that would appear to come from the air in the sample container."

Clearly, the samples for the instant application were different from those used in the example disclosed in the specification. Said samples were from a different supplier and have different impurity level. Therefore, the claims in the instant application have no support in the original specification because these claims are based on a different set of samples than those used in the example in the specification.

On the matter of lack of neither an adequate description nor an enabling disclosures as to how it is determined and ensured that thermal neutrons are actually caused to be trapped in the fullerene and remain to be trapped until the neutrons are used, appellants state in their 8/25/03 Response that:

a. "Inside the interior cavity of the fullerene molecule, the applicants expect that the interaction of the field of the nuclear magnetic moment of the neutron and the interior wall of the fullerene molecule traps the neutron near the center of the cavity." See page 11, last full sentence in the 8/25/03 Response

b. "The applicants postulate that the electron cloud of a fullerene molecule may produce a repulsive magnetic field that can trap neutrons within the interior cavity of the fullerene molecule." See page 7, 2nd full paragraph in the 8/25/03 Response.

In the instant brief, appellants now argue that "the claims say nothing" about magnetic field of the neutron and the electron cloud of the fullerene.

The claims *per se* do not recite the magnetic field and the electron cloud but appellants have admitted in their 8/25/03 Response that these elements are necessary keep the neutron at the center of the fullerene. Thus, the neutron magnetic field and the electron cloud of the fullerene are critical to the practice of the invention. Accordingly, the claims are not enabled by the disclosure because of the lack of support in the specification for these critical elements.

Appellant also argues that on the matter of the lack of disclosure of what causes a neutron to penetrate one wall and not to penetrate the other wall, appellant again argues in the brief that, "the claims say nothing about this." On the other hand, appellants state that the neutrons within a certain range of energies are trapped because the "neutron crosses the same electron cloud of the same fullerene molecule in opposite directions" (see page 9, first full paragraph of the 8/25/03 Response. Similar to the above, the electron cloud, which is critical to the exercise of the claimed invention, has no support in the specification.

As to the examiner's contention that appellants have not proven that the neutron is inside the fullerene cage as opposed to some other location, applicant argues that the Talnagi declaration attests that there is simply no other place that the neutron could be but inside the fullerene. The examiner disagrees. See section 9a) above on the examiner discussion of said declaration and the 9/28/01 Board Decision on SN 08/376846 on this issue.

Appellants argue that despite samples with unacceptable contaminants that complicate the measurements, they have been able to verify trapped thermal neutrons in the fullerene using commercially available samples. The examiner disagrees. As discussed earlier, the samples alleged to have provided the claimed verification are different from those used in the experiment discussed in the specification. Furthermore, appellants in the paragraph bridging pages 19, 20 of the 8/18/03 Response, argue that they spent three years to develop fullerene samples that were pure enough to permit their experiments, that the net effect of excessive impurities is a negative result and that their experiments only became successful after their suppliers developed processes that produced high purity (undefined) fullerenes (see also, for example, the underlined portions on page 27 of the 8/18/03 Response) (it is noted the appellants have not provided a date as to when their suppliers developed these processes to produce high purity fullerenes).

What the above admission by the appellants indicates is that they had to resort to specially prepared, high purity samples (not commercially available samples) to make their experiments "work."

Clearly, the claims are not enabled because an artisan cannot use commercially available samples (as claimed) because inherent contaminants would lead to erroneous results. An artisan would instead need custom-made samples of high purity to exercise the claimed invention. Also, since appellants have not disclosed how high should be the purity of the "high purity" samples, an artisan would have to resort to undue experimentation to arrive at a potentially successful set-up.

Appellants argue that they have anticipated and addressed potential errors resulting from contaminants. The examiner disagrees. Appellants may have addressed some potential sources of errors but they have not ruled out ALL errors. Specifically, appellants did not address the following potential sources of errors that were raised in the final Office action and reiterated in section 8 above, which affect all claims:

a) Appellants did not appear to completely search the "sample" for other beta emitters that could erroneously be attributed as resulting from decay of thermal neutrons trapped in the fullerene. The following other beta emitters including pure beta emitters (as well as positive beta (positron) emitters) have half-lives of around 10 minutes: As-79, Rb-91, Mo-102, Cs-139, Ho-154, Ce-131,

Cd-119, Fe-53, Cu-59 and N-13. The Second Talnagi Declaration does not list these emitters among the emitters that allegedly searched.

b) It appears that there is an initial "window" of at least 14-15 minutes (or even over 30 minutes – see step 8) after removal from the neutron flux before gamma analysis is performed, and thus, gamma emitters with shorter half lives would presumably be considered beta emitters and, as erroneous evidence of free thermal neutrons trapped in the fullerenes.

c) There is no indication as to why various time periods of irradiation in the example on page 7 of the specification, were utilized. It is unclear what effect the length of irradiation period has on the magnitude of experimental errors.

Appellants argue that they "have addressed potential sources of errors successfully and adequately in the application (page 8, line 3 to page 9, line 17)." The examiner disagrees. A review of the cited pages in the specification does not state what errors have been considered and the magnitude of these errors. There is also no showing that the experimental results fall outside the error bounds.

Appellants argue that their "laboratory maintains equipment in standard maintenance and calibration to insure correct and accurate measurements." The examiner disagrees. First, appellants have not defined the term "standard", and it is not clear what is encompassed by this term. Second, regardless of how well an instrument is maintained and calibrated, it still has inherent errors, and appellants

have not shown in the specification how these instrument errors, as well as other experimental errors, have been properly addressed.

a. 112, Second Paragraph Rejection

Appellants argue that claims 4-8, 10-14, and 16-19 are not indefinite because they are each directed to a property of the fullerene and not its use. The examiner disagrees.

A property is an intrinsic characteristic of an object that is always present therein. For example, the properties of an elemental particle, such as proton are its atomic weight and atomic number (or electrical charge). Where it is possible to alter this intrinsic characteristic, any such change must be for a purpose or intended use. One would not attempt, for example, boil water in a nuclear reactor coolant, i.e., change intrinsically liquid cooling water to steam (a gas), except for a specific purpose or use, e.g., to drive a steam turbine and produce energy.

In claim 4, the thermal neutrons, which are intrinsically at some low energy, are manipulated and accelerated to a higher energy level. The recited acceleration of the neutrons (which also accelerates the fullerene molecule that traps the neutron) is a process limitation, i.e., the neutron and fullerene molecule are being manipulated or worked upon to accelerate. This manipulation is for a purpose or use. For example, page 4, lines 5+ of the specification state that the neutron-containing fullerene is accelerated and made to impinge upon a thin metal foil to release the neutron. The recited acceleration of the trapped neutron

in the fullerene is a process step that is intended to achieve a specific purpose or use (e.g., release the neutron, for example, for non-destructive examination). The claimed acceleration of the neutron is NOT a property of the neutron. Rather the acceleration is a process imposed on the neutron to achieve a specific purpose or use. Thus, claim 4 is indefinite because it each merely recites a use without any active, positive steps delimiting how this use is actually practiced. See MPEP 706.03(d).

The same remark applies to claim 5 (providing a fullerene with an electric charge). A fullerene molecule inherently has no charge because it is an uncharged molecule composed of uncharged atoms. Charging the fullerene is intended for a use or purpose.

Claims 6, 7, 8, 10, 11 12, 13, 14, 16, 18 and 19 each recite as statement of intended or desired use as evidenced the language, "capable of ..." or a variation thereof (see claim 13).

All of these other use claims are indefinite for the same a reason as that given for claim 4.

(11) Related Proceeding(s) Appendix

Copies of the court or Board decision(s) identified in the Related Appeals and Interferences section of this examiner's answer are provided herein.

For the above reasons, it is believed that the rejections should be sustained.

Respectfully submitted,

R Palabrica

Ricardo J. Palabrica, Ph.D.

Conferees:

Meredith Petravick MP

Jack Keith

594826-001

THIS OPINION WAS NOT WRITTEN FOR PUBLICATION

The opinion in support of the decision being entered today (1) was not written for publication in a law journal and (2) is not binding precedent of the Board.

Paper No. 27

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES

Ex parte DANIEL R. SCHAEFER and JAMES M. SNEAD

Appeal No. 1999-1059
Application 08/376,846

ON BRIEF

Before ABRAMS, BARRETT, and CRAWFORD, Administrative Patent Judges.

CRAWFORD, Administrative Patent Judge.

11/28/01 Request Recon/notice appeal
R 10/28

Decision on Appeal

This is a decision on appeal from the examiner's final rejection of claims 1 through 3 and 32[1]. Claims 4 through 29 have been canceled and claims 30 and 31 were not entered.

The appellants' invention relates to a fullerene molecule having one or more free thermal neutrons trapped within the cage-like structure of the fullerene molecule. An understanding of the invention can be derived from a reading of exemplary claim 1 which appears in the appendix to the appellants' brief.

The prior art

The prior art references of record relied upon by the examiner in rejecting the appealed claims are:

Smalley	5,300,203	Apr. 05, 1994
Coppa	5,350,569	Sep. 27, 1994
Watson et al.(Watson) (WO)	93/15768	Aug. 19, 1993

Jimenez-Vazquez et al. (Jimenez-Vazquez) Hot-atom incorporation of tritium atoms into fullerenes, Chemical Physics Letters, Vol. 229, pp. 111-114 (1994)

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[1] Claim 32 was added in an amendment after final filed on March 6, 1998. This final rejection does not mention claim 32. However, as claim 32 is discussed in the examiner's answer and treated as rejected by appellants in the brief (brief at page 2), we will treat claim 32 as properly rejected.

Lindstrom et al. (Lindstrom) Measuring Hydrogen by Cold-Neutron Prompt-Gamma Activation Analysis, Journal of Radioanalytical and Nuclear Chemistry Articles, Vol. 180, No. 2, pp. 271-275 (1994)

Kikuchi et al. (Kikuchi), Encapsulation of Radioactive 159 Gd and 161 Tb Atoms in Fullerene Cages, J. Of the Am. Chem. Soc. Vol. 116, pp. 9775-9776 (1994)

Neumann et al. (Neumann), Coherent Quasielastic neutron Scattering Study of the Rotational Dynamics of C60 in the Orientationally Disordered Phase, Physical Review Letters, Vol. 67, No. 27, pp. 3808-3811 (1991)

The rejections

Claims 1 through 3 and 32 stand rejected under 35 U.S.C. § 112, first paragraph.

Claims 1 through 3 and 32 stand rejected under 35 U.S.C. § 102(a) as being clearly anticipated by any of Jimenez-Vazquez, Lindstrom or Kikuchi.

Claims 1 through 3 and 32 stand rejected under 35 U.S.C. § 102(b) as being clearly anticipated by any one of Neumann, Watson, Smalley or Coppa.

Rather than reiterate the conflicting viewpoints advanced by the examiner and the appellants regarding the above-noted rejections, we make reference to the answer (Paper No. 25) for the examiner's complete reasoning in support of the rejections, and to the appellants' brief (Paper No. 24) for the appellants' arguments thereagainst.

Opinion

In reaching our decision in this appeal, we have given careful consideration to the appellants' specification and claims, to the applied prior art references, and to the respective positions articulated by the appellants and the examiner. As a consequence of our review, we make the determinations which follow.

We turn first to the examiner's rejection of claims 1 through 3 and 32 under 35 U.S.C. § 112, first paragraph. We initially note that the description requirement found in 35 U.S.C. § 112 is separate from the enablement requirement of that paragraph. See In re Wilder, 736 F.2d 1516, 1520, 222 USPQ 369, 372 (CCPA 1977). As the examiner states that the disclosure is too vague and incomplete to enable one skilled in the art to make a proper and accurate analysis of exactly what was done, it is our determination that the examiner's rejection is based on the enablement clause of 112.

An analysis of whether the claims under appeal are supported by an enabling disclosure requires a determination of whether that disclosure contained sufficient information regarding the subject matter of the appealed claims as to enable one skilled in the pertinent art to make and use the claimed invention. The test for enablement is whether one skilled in the art could make

and use the claimed invention from the disclosure coupled with information known in the art without undue experimentation. See United States v. Telectronics, Inc., 857 F.2d 778, 785, 8 USPQ2d 1217, 1223 (Fed. Cir. 1988), cert. denied, 109 S.Ct. 1954 (1989); In re Stephens, 529 F.2d 1343, 1345, 188 USPQ 659, 661 (CCPA 1976).

In order to make a rejection, the examiner has the initial burden to establish a reasonable basis to question the enablement provided for the claimed invention. See In re Wright, 999 F.2d 1557, 1561-62, 27 USPQ2d 1510, 1513 (Fed. Cir. 1993) (examiner must provide a reasonable explanation as to why the scope of protection provided by a claim is not adequately enabled by the disclosure).

Once the examiner has established a reasonable basis to question the enablement provided for the claimed invention, the burden falls on the appellants to present persuasive arguments, supported by suitable proofs where necessary, that one skilled in the art would be able to make and use the claimed invention using the disclosure as a guide. See In re Brandstadter, 484 F.2d 1395, 1406, 179 USPQ 286, 294 (CCPA 1973). In making the determination of enablement, the examiner shall consider the original disclosure and all evidence in the record, weighing

evidence that supports enablement[2] against evidence that the specification is not enabling.

Thus, the dispositive issue is whether the appellants' disclosure, considering the level of ordinary skill in the art as of the date of the appellants' application, would have enabled a person of such skill to make and use the appellants' invention without undue experimentation. The threshold step in resolving this issue as set forth supra is to determine whether the examiner has met his burden of proof by advancing acceptable reasoning inconsistent with enablement. We adapt this reasoning and provide the following additional comments.

In the instant case, examiner is of the opinion that there is no enabling disclosure of how and in what manner it is determined and ensured that thermal neutrons are actually caused to be trapped in the fullerene and remain trapped in the fullerene.

We note that appellants' disclosure indicates that prior to the instant invention there was no known procedures for encapsulating neutrons within a fullerene molecule (specification

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[2] The appellants may attempt to overcome the examiner's doubt about enablement by pointing to details in the disclosure but may not add new matter. The appellants may also submit factual affidavits under 37 CFR § 1.132 or cite references to show what one skilled in the art knew at the time of filing the application.

at page 2). Yet, the only procedure disclosed in appellants' specification for capturing thermal neutrons within a fullerene molecule is to expose a fullerene molecule to a neutron flux of 10 to 500 kilowatts for about 5 to 15 minutes (specification at pages 5 and 7).

The specification states that the evidence that neutrons are trapped in the fullerene molecule consists of the presence of pure beta emitters with a half life of ten minutes in the fullerene that remain after the counts resulting from the gamma emitters have been stripped from the raw data.

The appellants' specification also states that there are few pure beta emitters and that fewer have a half life of ten minutes. However, the appellants have not submitted evidence to establish that the beta emitters in the fullerene molecule are not in fact other pure beta emitters. In this regard just because there are few pure beta emitters other than thermal neutrons does not establish that these other pure beta emitters are not within the fullerene.

In addition, it is our view that a person of ordinary skill in the art would not be enabled by the appellants' disclosure to ensure that even if thermal neutrons are the pure beta emitters, these thermal neutrons are in fact within the fullerene molecule rather than in the sample outside the fullerene or bonded to the

fullerene itself. In this regard, we note that Jimenez-Vazquez at page 112 indicates that although some tests may indicate that a substance is bonded to a fullerene, these test do not necessarily prove that the substance is within the fullerene.

In view of the foregoing, it is our conclusion that the examiner has established a prima facie case of lack of enablement and that the burden has shifted to the appellants to establish that the claimed subject matter is in fact enabled by the appellants' disclosure.

The appellants have presented several arguments in the brief which seek to establish that thermal neutrons are encapsulated within the fullerene. However, argument of counsel is no substitute for evidence. The only evidence submitted by the appellants is a declaration of Joseph W. Talnagi. The examiner has not considered this declaration. The declaration states:

> I consider the procedure effective to confirm the presence of free thermal neutrons in a fullerene molecule. I believe that the procedure described in the patent application at pages 7-9 could be easily repeated by a person skilled in the art of neutron activation analysis to detect thermal neutrons trapped in a fullerene molecule.

The above statements are conclusory in nature and the declaration does not include facts upon which the conclusions were based and therefore, even if we were to consider this declaration, it does not rebut the examiner's prima facie case of lack of enablement.

As such, we will affirm the examiner's rejection of claims 1 through 3 and 32 under 35 U.S.C. § 112, first paragraph.

We turn next to the examiner's rejection under 35 U.S.C. § 102 as being anticipated by any of Jimenez-Vazquez, Kikuchi or Lindstrom. To support a rejection of a claim under 35 U.S.C. § 102(b), it must be shown that each element of the claim is found, either expressly described or under principles of inherency, in a single prior art reference. See Kalman v. Kimberly-Clark Corp., 713 F.2d 760, 772, 218 USPQ 781, 789 (Fed. Cir. 1983), cert. denied, 465 U.S. 1026 (1984).

In the instant case, the examiner is of the opinion that each of Jimenez-Vazquez, Lindstrom and Kikuchi disclose the thermal neutron irradiation of fullerene molecules. The examiner refers to pages 111 and 112 of Jimenez-Vazquez, pages 271-273 of Lindstrom and page 9775 of Kikuchi. The examiner reasons that as the references each refer to irradiation of fullerene molecules with thermal neutrons, each reference must also inherently result in the production of a fullerene molecule having one or more free thermal neutrons trapped inside because the reference illustrates a method identical to appellants method of manufacturing the claimed product.

Jimenez-Vazquez discloses a method in which a sample containing Li and fullerenes is exposed to neutron irradiation.

The fullerene utilized in appellants' method does not contain lithium. In addition, the conditions that are disclosed for the appellants' method are not disclosed in Jimenez-Vazquez. For instance Jimenez-Vazquez discloses that the fullerene is exposed for 30 seconds and the appellants fullerene are exposed for 5 to 15 minutes. In addition, Jimenez-Vazquez does not disclose a neutron flux at a steady state thermal power of 10 to 500 kilowatts. As such, the Jimenez-Vazquez method is not identical to appellants' method. Therefore, in our view, the examiner has no factual basis for finding that thermal neutrons are inherently contained within the fullerene.

Kikuchi discloses a method in which a $Gd@C_{82}$ was irradiated by neutrons for the activation of Gd isotopes. The sample was irradiated for 6 hours rather than 10 to 15 minutes. The sample was not irradiated at a neutron flux of 10 to 500 kilowatts. As with Jimenez-Vazquez, Kikuchi does not disclose the identical method of the appellants and such the examiner's factual finding of inherency cannot be stand.

Lindstrom discloses a method to measure the hydrogen concentration in samples such as a fullerene molecule. However, we agree with the appellants that since Lindstrom does not disclose any details of the procedure such as the neutron flux or the duration of the irradiation, Lindstrom does not disclose a

method identical to the method utilized my the appellants. As the examiner has failed to establish that the method in Lindstrom is identical to appellants' method, the examiner has failed to establish a prima facie case of anticipation by Lindstrom.

Accordingly, we will not sustain the examiner's rejection of claims 1 through 3 and 32 as being anticipated by Jimenez-Vazquez, Kikuchi or Lindstrom.

We turn next to the examiner's rejection of claims 1 through 3 and 32 under 35 U.S.C. § 102(b) as being anticipated by any of Neumann, Watson, Smalley or Coppa. In support of this rejection, the examiner states:

> [T]he references are each considered as at least inherently referring to the thermal neutron irradiation of fullerene molecules. This is also how appellant makes the claimed article of a fullerene molecule with a thermal neutron trapped therein.[Examiner's answer page 8.]

In regard to Neumann the examiner states:

> Neumann et al (II) refer to neutron irradiation of fullerenes with neutrons from the NBSR (reactor) at NIST (e.g. see page 3808). Such would inherently involve thermal neutrons and in any event, any non-thermal neutrons would become thermalized due to the carbon and graphite which is present. [Examiner's answer at page 7]

We agree with the appellants that the disclosure in Neumann does not disclose enough details about the method therein described to establish that a thermal neutron is necessarily

captured in a fullerene. For instance, Neumann does not disclose the power of the irradiation or the length of the irradiation. In view of the lack of details disclosed in Neumann, it is our opinion that the examiner has no factual basis for concluding that neutrons are captured in the fullerene molecule.

In regard to the Watson reference, the examiner states:

> Watson et al (e.g. see pages 7,8,25,38,43) refer to the use of fullerenes for neutron capture therapy for cancer patients (such inherently involves the use of thermal neutrons). [Examiner's answer at page 7.]

We agree with the appellants that Watson discloses enclosing a metal atom or ion within the fullerene cage rather than enclosing a neutron within a fullerene cage (page 7 to 8). Watson does not disclose that a fullerene is irradiated with a neutron flux of 10 to 500 watts for 10 to 15 minutes. As such, we do not agree that the examiner has established that a thermal neutron is necessarily enclosed in a fullerene molecule in Watson.

In regard to Smalley and Cappa, the examiner states:

> Due to the carbon and other materials present, at least a portion of these neutrons will be thermalized. These neutrons will thus be available to interact with the fullerenes which are present, just as in appellants case. [Examiner's answer at pages 7 to 8.]

The examiner has not met his burden for establishing a prima facie case of anticipation by inherency in regard to Smalley and Cappa because the examiner has not established that the conditions disclosed in Smalley and Cappa would necessarily result in a thermal neutron being captured in the fullerene cage. We note that neither Smalley nor Cappa disclose a neutron flux of 10 to 500 watts and a neutron flux of 10 to 15 minutes. It is not enough that the examiner establish that the neutrons that are in the examiner's opinion produced in Smalley and Cappa are available to interact with the fullerene molecules. The examiner must establish that they are necessarily captured in the fullerenes disclosed in Smalley and Cappa. This the examiner has not done.

In view of the foregoing, we will not sustain the examiner's rejection of claims 1 through 3 and 32 as being anticipated by Neumann, Watson or Smalley or Cappa.

In summary:

The examiner's rejection of claims 1 through 3 and 32 under 35 U.S.C. § 112, first paragraph is sustained.

The examiner's rejection of claims 1 through 3 and 32 under 35 U.S.C. § 102(a) as being anticipated by any of Jimenez-Vazquez, Kikuchi or Lindstrom is not sustained.

The examiner's rejection of claims 1 through 3 and 32 under 35 U.S.C. § 102(b) as being anticipated by Neumann, Smalley or Coppa is not sustained.

No time period for taking any subsequent action in connection with this appeal may be extended under 37 CFR § 1.136 (a).

AFFIRMED

Neal E. Abrams
Administrative Patent Judge

Lee E. Barrett
Administrative Patent Judge

Murriel E. Crawford
Administrative Patent Judge

BOARD OF PATENT APPEALS AND INTERFERENCES

MC/dym

Appeal No. 1999-1059
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